REMARKS

Applicant appreciates the Examiner's indication of the allowability of Claims 6-10, 15-21 and 26-31. Applicant has rewritten these claims in independent form including all of the limitations of the base claim and any intervening claims.

The Examiner has rejected Applicant's Claims 1-5, 11-14 and 22-25 under 35 U.S.C. 102(e) as being anticipated by the reference to Farrant et al. (U.S. Patent No. 6,314,043). Applicant has amended Claims 1, 11 and 22 in view of the Examiner's remarks and reconsideration of the rejected claims is requested in view of the remarks which follow. Claim 25 has been cancelled since the features of this claim have been incorporated into amended Claim 22.

Applicant's method and apparatus provide a means of holding a wireline tool string in place downhole during underbalanced perforating and/or flowing of a well after perforating. The anchoring system utilized is designed to be set by supplying power to a downhole motor assembly, thereby forcing a slip guide behind gripping slips which are forced against the surrounding casing or tubing. Tension is then pulled on the wireline cable to ensure that the assembly is "set." Once the surface operator has confirmed that the assembly is set, the perforating guns are fired and the well is flowed. After flowing the well and stabilizing the pressure in the wellbore, the assembly is unset by again suppling power to the motor to reverse the setting motion and remove the slip guide from behind the gripping slips. If power cannot be supplied to the motor after perforating, a mechanical back-up release mechanism is provided. The back-up release is actuated by slacking off on the wireline to "scope" the tool down and engage a releasing neck on a collet latch sub. An upward pull then shears one or more shear pins and allows the back-up mechanism to release the tool with a continued upward pull from the well surface.

Several of the features described above have been described more fully in the amendments to the remaining claims. Specifically, Claims 1 and 11 have been amended to more fully describe the electrical switching means which is used to supply power to the downhole motor to set and then unset the gripping slips. Claim 22 has been amended to more fully describe the manual back-up

release mechanism which is utilized to release the gripping slips if, for some reason, the electrical switching system fails. The particular way in which these features operate in Applicant's device are thought to distinguish the teaching of the Farrant ('043) reference cited by the Examiner.

The preferred invention described in the Farrant reference utilizes a "detonator" to blow apart a release bolt to engage the slips with the surrounding casing (see Col. 5, lines 43-53). In one embodiment, the engagement members are automatically retracted after firing of the perforating guns by a "pump-back piston" (Col 6, lines 13-17). The electrical circuitry used to set and unset the preferred form of the invention is described in some detail in Col. 7, beginning at about line 36. However, the preferred form of the invention is vastly different from Applicant's claimed invention in utilizing the detonating action to set the device and the pump-back piston to unset the device. For example, a Zener diode 204 is used "for preventing subsequent positive power (on line 140) from becoming shunted to ground should the release detonator 132 become shorted after detonation" (Col. 7, lines 43-44). Applicant's assembly does not employ such a "detonator" system and is not concerned with this problem.

An alternate form of the Farrant device is described beginning at Col. 8, line 41. In that embodiment, a "reversible motor" 304 is used to set and unset the device. Rotation of a rod 308 causes movement of actuation nuts 314 and 316 to move in either of opposite directions to move the engagement structures 330. While the mechanical operation of the reversible motor is described in some detail beginning at about Col. 8, line 46, the electrical circuitry used to power the reversible motor is not described.

Applicant's Claims 1 and 11 now describe the electrical switching means used to set and unset Applicant's device in greater detail. More specifically, the amended Claim 1 calls for:

> *"switch means included as a part of the electric motor assembly for reversing the direction of axial movement of the inner mandrel relative to the outer mandrel to retract the gripping slips and return the slips to the start position, the switch means including a power connection of a first polarity to directly control motor switching*

with a power connection of a second, opposite polarity being employed to both sense current drawn by the motor and to be employed to operate the wireline tool."

Claim 11 has been amended similarly but is more specific in describing the wireline tool as being a "perforating gun."

The exact functioning of Applicant's switch means is described in the Specification as originally filed beginning at page 13, line 13 as follows:

"Initially, during run-in, power through diode D11 is connected through switching device S2 and switching device S1, which is configured to pass the power in a first polarity, to motor M1. Power out of the motor M1 is connected to the negative feedback loop (resistor R7:1) of op-amp U1 through resistor R8:1, allowing the current drawn by motor M1 to be monitored. When the motor M1 binds (and begins drawing significantly more current) during setting of the wireline assembly, op-amp U1 trips switching device S2 to disconnect the applied input power from motor M1, which in turn causes switching device S1 to trip, reversing the polarity of the connection of motor M1 to the power connections at diodes D11 and D12. Op-amp U1 and switching device S2 may then be reset by disconnecting and reconnecting power to the control circuit. Power is therefore again transmitted to motor M1 from diode D11, but with the opposite polarity as before due to the prior tripping of switching device S1. Subsequent cycling (disconnect/reconnect) of power to the control circuit may be employed to restore switching device S1 to its original position."

The use of the particular switch circuitry described is a distinct advantage in Applicant's assembly in that only the positive power connection (through diode D11) is employed to directly control motor switching, although the negative power connection through the diode D12 is employed to sense current drawn by motor M1. This allows the negative power connection from the surface to be employed to fire the perforating guns. This arrangement simplifies the circuitry and number of

wires passing from the surface downhole and provides a hardy and reliable means for both setting the gripping slips and firing the perforating guns.

Applicant's method Claim 22 has been amended to more specifically describe the manual release mechanism for the assembly. The normal setting method is first described in which an electrical current is supplied to the downhole electric motor assembly to move the inner radial mandrel axially relative to the outer mandrel and thereby set the gripping slips. Tension is then pulled on the wireline perforating assembly by pulling on the wireline from the well surface. The perforating gun assembly is then actuated by an electric current supplied from the well surface. In the normal practice of the invention, the direction of movement of the inner mandrel would be reversed relative to the outer mandrel by the application of an additional electrical current from the well surface through the wireline. This movement would allow the gripping slips to be retracted radially inward to the start position.

In this case, however, the electro-mechanical wireline assembly is further provided with back-up manual release means for manually retracting the gripping slips radially inward upon completion of wellbore operations. This manual release is described in some detail in amended Claim 22 iin terms of a "collet housing including a plurality of downwardly extending collet fingers which engage and act upon the gripping slip assembly upon slacking off tension being applied to the wireline perforating assembly through the wireline from the well surface, whereby the gripping slips are retracted radially inward to the start position." The electro-mechanical wireline assembly can then be retrieved to the well surface.

The Farrant reference describes several alternative methods for retracting the gripping slips used to set various versions of the tool. For example, Col. 5, lines 60-67 describe a rupture disc and orifice which are used to bleed off pressure in a chamber for the "automatic" retraction of the engagement members (Col. 6, lines 13-15). The Farrant reference also describes an "active" retracting operator beginning at Col. 6, line 24, including a retracting piston and retracting mandrel. A frangible element and detonating elements are blown apart to remove support from below the retracting mandrel, allowing retrieval of the tool (Col. 6, lines53-55).

Significantly, the Farrant reference does not describe a manual back-up release for the "reversible motor" version of the tool. Col. 9, lines 8-14 merely state that the device "allows repeated settings and retractions." Thus, Farrant does not anticipate Applicant's back-up or manual release as described in method Claim 22 in terms of his reversible motor embodiment of his invention. Additionally, even if one turns to the other described release mechanisms for other versions of the Farrant tool, these mechanisms are completely different from the method employed by Applicant, as described in amended Claim 22.

Based upon the above arguments and amendments, Claims 1-24 and 26-31 are thought to be allowable over the art of record and an early notification of the same would be appreciated. No additional fees are thought to be due. If any additional fees are due for the continued prosecution of this application, please charge the same to Applicant's Deposit Account No. 50-0259 Bracewell & Patterson, LLP).

Respectfully submitted,

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Charles D. Gunter, Jr.
Reg. No. 29,386
Bracewell & Patterson, LLP
201 Main Street, Suite 1600
Fort Worth, Texas 76102
(817) 332-8143
ATTORNEY FOR APPLICANT(S)

Amended claims with underlining and brackets:

1. (Once amended) An electro-mechanical wireline assembly for anchoring a wireline tool string in place in a well bore during underbalanced well conditions, the assembly comprising:

upper connecting means for connecting the assembly to a wireline leading to the well surface;

lower connecting means for engaging a wireline tool;

an outer mandrel connected to the lower connecting means;

an inner mandrel carried at least partly within the outer mandrel and capable of axial movement relative thereto;

a slip gripping assembly carried on the outer mandrel and including a plurality of gripping slips normally biased radially inward but movable radially outward for engaging a surrounding well bore and holding the wireline tool string in place in the well bore;

an electric motor assembly carried on the wireline assembly between the upper connecting means and the lower connecting means, the electric motor assembly being actuable by an electric current supplied from the well surface through the wireline to effect axial movement of the inner mandrel relative to the outer mandrel to expand the gripping slips in a radial direction between a start position and a set position;

switch means included as a part of the electric motor assembly for reversing the direction of axial movement of the inner mandrel relative to the outer mandrel to retract the gripping slips and return the slips to the start position, the switch means including a power connection of a first polarity to directly control motor switching with a power connection of a second, opposite polarity being employed to both sense current drawn by the motor and to be employed to operate the wireline tool; and

wherein the assembly further comprises back-up manual release means for manually retracting the gripping slips radially inward upon completion of wellbore operations.

2. The electro-mechanical wireline assembly of claim 1, wherein the lower connecting means is connected to a wireline tool selected from the group consisting of a well perforating gun assembly and a well production logging assembly.

3. The electro-mechanical wireline assembly of claim 2, wherein the slip gripping assembly includes at least three gripping slips located 120 degrees apart on an exterior surface of the outer mandrel.

4. The electro-mechanical wireline assembly of claim 3, wherein the electric motor assembly includes an electric motor and a screw driven by the electric motor to effect axial movement of the inner mandrel relative to the outer mandrel.

5. The electro-mechanical wireline assembly of claim 4, wherein the screw is drivable in either a forward or reverse direction by the application of electric current through the wireline from the well surface to the electric motor.

6. (Once amended) [The electro-mechanical wireline assembly of claim 5,] An electro-mechanical wireline assembly for anchoring a wireline tool string in place in a well bore during underbalanced well conditions, the assembly comprising:

upper connecting means for connecting the assembly to a wireline leading to the well surface;

lower connecting means for engaging a wireline tool;

an outer mandrel connected to the lower connecting means;

an inner mandrel carried at least partly within the outer mandrel and capable of axial movement relative thereto;

a slip gripping assembly carried on the outer mandrel and including a plurality of gripping slips normally biased radially inward but movable radially outward for engaging a surrounding well bore and holding the wireline tool string in place in the well bore;

an electric motor assembly carried on the wireline assembly between the upper connecting means and the lower connecting means, the electric motor assembly being actuable by an electric current supplied from the well surface through the wireline to effect axial movement of the inner mandrel relative to the outer mandrel to expand the gripping slips in a radial direction between a start position and a set position;

switch means included as a part of the electric motor assembly for reversing the direction of axial movement of the inner mandrel relative to the outer mandrel to retract the gripping slips and return the slips to the start position;

wherein the assembly further comprises back-up manual release means for manually retracting the gripping slips radially inward upon completion of wellbore operations;

wherein the lower connecting means is connected to a wireline tool selected from the group consisting of a well perforating gun assembly and a well production logging assembly;

wherein the slip gripping assembly includes at least three gripping slips located 120 degrees apart on an exterior surface of the outer mandrel;

wherein the electric motor assembly includes an electric motor and a screw driven by the electric motor to effect axial movement of the inner mandrel relative to the outer mandrel;

wherein the screw is drivable in either a forward or reverse direction by the application of electric current through the wireline from the well surface to the electric motor; further comprising:

a collet housing including a plurality of downwardly extending collet fingers carried about the outer mandrel at an upper extent thereof, the collet housing being threadedly engaged to an outer motor housing.

7. The electro-mechanical wireline assembly of claim 6, wherein the outer motor housing is threadedly engaged to a coiled wire housing which, in turn, is threadedly engaged to the top adapter.

8. The electro-mechanical wireline assembly of claim 7, wherein the collet housing is initially retained in a running in position by at least one retaining dog carried in an opening provided on the outer mandrel adjacent the upper extent thereof.

9. The electro-mechanical wireline assembly of claim 8, wherein the inner mandrel is provided with a recess for receiving the at least one retaining dog, movement of the retaining dog into the recess serving to allow movement of the collet housing axially downward relative to the outer mandrel whereby the collet fingers can engage a collet latch housing.

10. The electro-mechanical wireline assembly of claim 9, wherein the collet latch housing is connected to a slip guide which underlies the gripping slips in the set position, the connection to the slip guide being severable by upward axial movement of the collet housing, thereby allowing the slip guide to be moved from beneath the gripping slips whereby the gripping slips can be returned to the start position.

11. (Once amended) An electro-mechanical wireline assembly for anchoring a perforating gun assembly in place in a well bore during underbalanced well conditions, the assembly comprising:

upper connecting means for connecting the assembly to a wireline leading to the well surface;

lower connecting means engaged to a perforating gun assembly including at least one wireline actuated perforating gun;

an outer mandrel connected to the lower connecting means;

an inner mandrel carried at least partly within the outer mandrel and capable of axial movement relative thereto;

a slip gripping assembly carried on the outer mandrel and including a plurality of gripping slips normally biased radially inward but movable radially outward for engaging a surrounding well bore and holding the wireline tool string in place in the well bore;

an electric motor assembly carried on the wireline assembly between the upper connecting means and the lower connecting means, the electric motor assembly being actuable by an electrical current

supplied from the well surface through the wireline to effect axial movement of the inner mandrel relative to the outer mandrel to expand the gripping slips in a radial direction between a start position and a set position;

switch means provided as a part of the electric motor assembly and actuable to move the inner mandrel in a reverse axial direction in response to an electrical current supplied through the wireline from the well surface to retract the gripping slips and return the slips to the start position, the switch means including a power connection of a first polarity to directly control motor switching with a power connection of a second, opposite polarity being employed to both sense current drawn by the motor and to be employed to fire the perforating gun.

12. The electro-mechanical wireline assembly of claim 11, wherein the slip gripping assembly includes at least three gripping slips located 120 degrees apart on an exterior surface of the outer mandrel.

13. The electro-mechanical wireline assembly of claim 12, wherein the electric motor assembly includes an electric motor and a screw driven by the electric motor and connected to the inner mandrel to effect axial movement of the inner mandrel relative to the outer mandrel.

14. The electro-mechanical wireline assembly of claim 13, wherein the screw is drivable in either a forward or reverse direction by the application of electric current through the wireline from the well surface to the electric motor.

15. (Once amended) [The electro-mechanical wireline assembly of claim 14,] An electro-mechanical wireline assembly for anchoring a perforating gun assembly in place in a well bore during underbalanced well conditions, the assembly comprising:

upper connecting means for connecting the assembly to a wireline leading to the well surface;

lower connecting means engaged to a perforating gun assembly including at least one wireline actuated perforating gun;

an outer mandrel connected to the lower connecting means;

an inner mandrel carried at least partly within the outer mandrel and capable of axial movement relative thereto;

a slip gripping assembly carried on the outer mandrel and including a plurality of gripping slips normally biased radially inward but movable radially outward for engaging a surrounding well bore and holding the wireline tool string in place in the well bore;

an electric motor assembly carried on the wireline assembly between the upper connecting means and the lower connecting means, the electric motor assembly being actuable by an electrical current supplied from the well surface through the wireline to effect axial movement of the inner mandrel

relative to the outer mandrel to expand the gripping slips in a radial direction between a start position and a set position;

switch means provided as a part of the electric motor assembly and actuable to move the inner mandrel in a reverse axial direction in response to an electrical current supplied through the wireline from the well surface to retract the gripping slips and return the slips to the start position;

wherein the slip gripping assembly includes at least three gripping slips located 120 degrees apart on an exterior surface of the outer mandrel;

wherein the electric motor assembly includes an electric motor and a screw driven by the electric motor and connected to the inner mandrel to effect axial movement of the inner mandrel relative to the outer mandrel;

wherein the screw is drivable in either a forward or reverse direction by the application of electric current through the wireline from the well surface to the electric motor; further comprising:

a collet housing including a plurality of downwardly extending collet fingers carried about the outer mandrel at an upper extent thereof, the collet housing being threadedly engaged to an outer motor housing.

16. The electro-mechanical wireline assembly of claim 15, wherein the outer motor housing is threadedly engaged to a coiled wire housing which, in turn, is threadedly engaged to the top adapter.

17. The electro-mechanical wireline assembly of claim 16, wherein the collet housing is initially retained in a running in position by at least one retaining dog carried in an opening provided on the outer mandrel adjacent the upper extent thereof.

18. The electro-mechanical wireline assembly of claim 17, wherein the inner mandrel is provided with a recess for receiving the at least one retaining dog, movement of the retaining dog into the recess serving to allow movement of the collet housing axially downward relative to the outer mandrel whereby the collet fingers can engage a collet latch housing.

19. The electro-mechanical wireline assembly of claim 18, wherein the collet latch housing is connected to a slip guide which underlies the gripping slips in the set position, the connection to the slip guide being severable by upward axial movement of the collet housing and the collet latch housing, thereby allowing the slip guide to be moved from beneath the gripping slips whereby the gripping slips can be returned to the start position.

20. The electro-mechanical wireline assembly of claim 19, wherein the slip guide includes upper collet fingers which are initially retained in a running in position by an interior surface of the collet latch housing and wherein the collet latch housing has an internal profile for receiving the slip guide collet fingers upon upward axial movement effected by the engagement of the collet housing collet fingers with the collet latch housing.

21. The electro-mechanical wireline assembly of claim 20, wherein the collet latch housing is initially connected to the slip guide by a plurality of shear screws, the shear screws being severable by upward tension exerted on the collet latch housing by the collet housing.

22. (Once amended) A method for anchoring a wireline perforating assembly in place in a well bore during underbalanced well conditions and for manually retrieving the assembly, the method comprising the steps of:

providing an electro-mechanical wireline assembly having upper connecting means for connecting the assembly to a wireline leading to the well surface;

connecting a wireline perforating assembly to a lower connecting means provided on the electro-mechanical wireline assembly;

providing an outer mandrel connected to the lower connecting means;

providing an inner mandrel carried at least partly within the outer mandrel and capable of axial movement relative thereto;

providing a slip gripping assembly carried on the outer mandrel and including a plurality of gripping slips normally biased radially inward but movable radially outward for engaging a surrounding well bore and holding the wireline tool string in place in the well bore;

providing an electric motor assembly carried on the wireline assembly between the upper connecting means and the lower connecting means, the electric motor assembly being actuable by an electric current supplied from the well surface through the wireline to effect axial movement of the inner mandrel relative to the outer mandrel to expand the gripping slips in a radial direction between a start position and a set position;

providing switch means included as a part of the electric motor assembly for reversing the direction of axial movement of the inner mandrel relative to the outer mandrel to retract the gripping slips and return the slips to the start position;

running the electro-mechanical wireline assembly into position at a subterranean location within the well bore;

supplying an electrical current to the electric motor assembly to move the inner radial mandrel axially relative to the outer mandrel and thereby set the gripping slips;

pulling tension on the wireline perforating assembly by pulling on the wireline from the well surface;

actuating the perforating gun assembly by an electric current supplied from the well surface;

[reversing the direction of movement of the inner mandrel relative to the outer mandrel by the application of an additional electrical current from the well surface through the wireline, said movement serving to allow the gripping slips to be retracted radially inward to the start position; and]

wherein the electro-mechanical wireline assembly is further provided with back-up manual release means for manually retracting the gripping slips radially inward upon completion of wellbore operations, and wherein the back-up manual release includes a collet housing including a plurality of downwardly extending collet fingers which engage and act upon the gripping slip assembly upon slacking off tension being applied to the wireline perforating assembly through the wireline from the well surface, whereby the gripping slips are retracted radially inward to the start position; and

retrieving the electro-mechanical wireline assembly and perforating gun assembly to the well surface.

23. The method of claim 22, wherein the electric motor assembly includes an electric motor and a screw driven by the electric motor to effect axial movement of the inner mandrel relative to the outer mandrel.

24. The method of claim 22, wherein the switch means is actuated to drive the screw in either a forward or reverse direction by the application of electric current through the wireline from the well surface to the electric motor.

25. (Cancel) The method of claim 24, wherein the electro-mechanical wireline assembly is further provided with back-up manual release means for manually retracting the gripping slips radially inward upon completion of wellbore operations.

26. (Once amended) [The method of claim 25,] A method for anchoring a wireline perforating assembly in place in a well bore during underbalanced well conditions, the method comprising the steps of:

providing an electro-mechanical wireline assembly having upper connecting means for connecting the assembly to a wireline leading to the well surface;

connecting a wireline perforating assembly to a lower connecting means provided on the electro-mechanical wireline assembly;

providing an outer mandrel connected to the lower connecting means;

providing an inner mandrel carried at least partly within the outer mandrel and capable of axial movement relative thereto;

providing a slip gripping assembly carried on the outer mandrel and including a plurality of gripping slips normally biased radially inward but movable radially outward for engaging a surrounding well bore and holding the wireline tool string in place in the well bore;

providing an electric motor assembly carried on the wireline assembly between the upper connecting means and the lower connecting means, the electric motor assembly being actuable by an electric current supplied from the well surface through the wireline to effect axial movement of the inner mandrel relative to the outer mandrel to expand the gripping slips in a radial direction between a start position and a set position;

providing switch means included as a part of the electric motor assembly for reversing the direction of axial movement of the inner mandrel relative to the outer mandrel to retract the gripping slips and return the slips to the start position;

running the electro-mechanical wireline assembly into position at a subterranean location within the well bore;

supplying an electrical current to the electric motor assembly to move the inner radial mandrel axially relative to the outer mandrel and thereby set the gripping slips;

actuating the perforating gun assembly by an electric current supplied from the well surface;

reversing the direction of movement of the inner mandrel relative to the outer mandrel by the application of an additional electrical current from the well surface through the wireline, said movement serving to allow the gripping slips to be retracted radially inward to the start position;

retrieving the electro-mechanical wireline assembly and perforating gun assembly to the well surface;

wherein the electric motor assembly includes an electric motor and a screw driven by the electric motor to effect axial movement of the inner mandrel relative to the outer mandrel;

wherein the switch means is actuated to drive the screw in either a forward or reverse direction by the application of electric current through the wireline from the well surface to the electric motor;

wherein the electro-mechanical wireline assembly is further provided with back-up manual release means for manually retracting the gripping slips radially inward upon completion of wellbore operations; and

wherein the back-up manual release includes a collet housing including a plurality of downwardly extending collet fingers carried about the outer mandrel at an upper extent thereof, the collet housing being threadedly engaged to an outer motor housing, the outer motor housing being threadedly engaged to a coiled wire housing which, in turn, is threadedly engaged to the top adapter.

27. The method of claim 26, wherein the collet housing is initially retained in a running in position by at least one retaining dog carried in an opening provided on the outer mandrel adjacent the upper extent thereof.

28. The method of claim 27, wherein the inner mandrel is provided with a recess for receiving the at least one retaining dog, movement of the retaining dog into the recess serving to allow movement of the collet housing axially downward relative to the outer mandrel whereby the collet fingers can engage a collet latch housing.

29. The method of claim 28, wherein the collet latch housing is connected to a slip guide which underlies the gripping slips in the set position, the connection to the slip guide being severable by upward axial movement of the collet housing, thereby allowing the slip guide to be moved from beneath the gripping slips whereby the gripping slips can be returned to the start position.

30. The method of claim 29, wherein the slip guide includes upper collet fingers which are initially retained in a running in position by an interior surface of the collet latch housing and wherein the collet latch housing has an internal profile for receiving the slip guide collet fingers upon upward axial movement effected by the engagement of the collet housing collet fingers with the collet latch housing.

31. The method of claim 30, wherein the collet latch housing is initially connected to the slip guide by a plurality of shear screws, the shear screws being severable by upward tension exerted on the collet latch housing by the collet housing.